We claim:

1. A method for encapsulating, sealing, plugging, or supporting of a biological material comprising:

a) mixing (i) a water soluble biocompatible macromer comprising at least two free radical-polymerizable substituents, wherein the macromer is non-toxic and has a molecular weight of at least 400, (ii) a biological material, and (iii) a non-toxic free radical polymerization initiator selected from the group consisting of visible light or long wavelength ultraviolet light-activatable free radical initiators, thermal activatable free radical initiators, benzoyl peroxide, potassium persulfate and ammonium persulfate; and

b) exposing the mixture to the activating agent to cause polymerization of the macromers.

2. The method of claim 1 wherein the biological material is selected from the group consisting of mammalian cells, cell aggregates, and cell tissue.

3. The method of claim 1 wherein the biologically active molecule is selected from the group consisting of peptides of less than one hundred amino acids, proteins of one hundred or more amino acids, polysaccharides, nucleic acids, organic drugs, and inorganic drugs.

4. The method of claim 1 wherein the free-radical polymerizable substituents contain carbon-carbon double or triple bonds.

5. The method of claim 1 where a non-toxic catalyst or accelerator is added to the mixing step.

6. The method of claim 1 wherein the water soluble macromer is selected from the group consisting of poly(ethylene glycol), poly(ethylene oxide), poly(vinyl alcohol), poly(vinylpyrrolidone), poly(ethyloxazoline), poly(amino acid),

polysaccharides, proteins, or a block or random copolymer thereof comprising two or more polymerizable substituents.

7. The method of claim 6 wherein the polysaccharide is selected from the group consisting of alginate, hyaluronic acid, chondroitin sulfate, dextran, dextran sulfate, heparin, heparin sulfate, heparan sulfate, chitosan, gellan gum, xanthan gum, guar gum, and K-carrageenan.

8. The method of claim 6, wherein the protein is selected from the group consisting of gelatin, collagen and albumin.

9. The method of claim 1 wherein the initiator is a thermal initiator and the initiating agent is a change in temperature.

10. The method of claim 1 wherein the free-radical polymerizable substituents are selected from the group of macromers containing two or more acrylate groups.

11. The method of claim 1 wherein the gel is prepared from macromers comprising an acrylate terminated poly(ethylene glycol).

12. The method of claim 1 wherein the polymerization initiator is selected from the group consisting of an eosin dye, a substituted eosin dye, riboflavin, acetophenone, a substituted acetophenone, a fluoroscein dye, a substituted fluoroscein dye, camphorquinone, rose bengal, methylene green, methylene blue, eosin Y, ethyl eosin, acridine orange, xanthine dye, and thioxanthine dyes.

14. The method of claim 1 wherein the polymerization initiator is selected from the group consisting of erythrosin, phloxime, and thionine.

15. The method of claim 5 wherein the catalyst or accelerator is an amine.

16. The method of claim 15 wherein the amine is selected from the group consisting of triethanolamine, triethylamine, ethanolamine, N-methyl diethanolamine, N,N-dimethyl benzylamine, dibenzyl amine, N-benzyl ethanolamine, N-isopropyl benzylamine,

tetramethyl ethylene-diamine, lysine, ornithine, histidine and arginine.

17. The method of claim 1 wherein polymerization is initiation by light having a wavelength of between 320 and 800 nm.

18. The method of claim 17 or 2 wherein the light has a wavelength of 514 nm or 365 nm.

19. The method of claim 2, wherein the mammalian cell, mammalian cell aggregate, or mammalian tissue is contacted with a solution of a light sensitive photoinitiator to allow binding of the photoinitiator to the mammalian cell, mammalian cell aggregate, or mammalian tissue and the unbound initiator is removed prior to contacting it with the polymer or oligomer.

20. The method of claim 19 wherein the unbound initiator is removed by dilution with the macromer solution such that polymerization occurs only at the surface of the mammalian cell, mammalian cell aggregate, or mammalian tissue.

21. The method of claim 1, wherein the macromer solution is shaped and then polymerized.

22. The method of claim 1 wherein the gel contains a supporting structure.

23. The method of claim 1 wherein the polymer is selected and the polymerization is controlled to produce a desired permeability around the encapsulated material.

24. The method of claim 1 wherein polymerization of the macromer solution adheres tissue to other tissue or cells.

25. The method of claim 2 wherein biologically active material is encapsulated with the cells or tissue.

26. The method of claim 1, wherein a photopolymerizable polycation is preadsorbed to the molecule or material being encapsulated to increase attachment of the gel to the molecule or material.

27. The method of claim 1 wherein the macromer solution is applied to a tissue lumen and then polymerized to form a coating or support on the surface of the tissue lumen.

28. A method for the preparation of a biocompatible substrate comprising:

a) mixing (i) a water soluble biocompatible macromer comprising at least two free radical-polymerizable substituents, wherein the macromer is non-toxic and has a molecular weight of at least 400, (ii) a biological material, and (iii) a non-toxic free radical polymerization initiator selected from the group consisting of visible light or long wavelength ultraviolet light-activatable free radical initiators, thermal activatable free radical initiators, benzoyl peroxide, potassium persulfate and ammonium persulfate; and

b) exposing the mixture to the activating agent to cause polymerization of the macromers.

29. The method of claim 28 wherein a catalyst or accelerator is added in the mixing step.

30. The method of claim 28 wherein the substrate is selected from the group consisting of microspheres, membranes, woven matrices, porous matrices and prosthetic implants.

31. The method of claim 28, wherein the substrate is treated with an initiator, the unbound initiator is removed, the macromer is applied to the substrate and polymerized.

32. A substrate having a polymeric coating formed by free radical polymerization using an initiator selected from the group consisting of visible light or long wavelength ultraviolet light-activatable free radical initiators, thermal activatable free radical initiators, benzoyl peroxide, potassium persulfate and ammonium persulfate of a water soluble macromer comprising at least two free-radical polymerizable substituents applied to the substrate.

33. A coating on a tissue lumen formed of a polymer prepared by the free radical polymerization of a biocompatible water soluble macromer that has covalently linked to it at least two free radical-polymerizable substituents.

34. The coating of claim 33 wherein the tissue lumen is a blood vessel.

35. A method for applying a polymeric coating to tissue or cells comprising applying a photoinitiator to the cells or tissue, removing unbound photoinitiator, applying a solution of water soluble macromer comprising at least two free radical-polymerizable substituents to the cells or tissue, and exposing the solution to visible or long wavelength ultraviolet light.